

## Financial Impacts of Regional Differences in Dairies

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**Abstract:** The sensitivity of net cash farm income to changes in selected production variables, output prices, and input costs varies significantly across representative U.S. dairies. Different regions of the country were impacted differently by changes to production and prices.

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## **Financial Impacts of Regional Differences in Dairies**

### **Abstract**

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### **Introduction and Objectives**

Dairy production across the United States is very diverse. From different herd sizes, production techniques, breeds of cows, and technologies, there are many differences across different regions of the country. Feed costs, milk price, milk production, and environment regulations are all influenced by regional differences. There are two things that need to be examined: what factors impact profitability the most and do the factors vary by regions?

Sartwelle et al. analyzed whether the chief factors influencing cow-calf profitability vary by region for cow calf operations. The states that were examined were Texas, Montana, Missouri, Colorado, Nevada, South Dakota, and New Mexico. That study found larger changes in profitability result from changes in productivity and output prices than from changes in input prices.

The objective of this study is to examine whether the chief factors influencing dairy profitability vary by region. This study will identify several of the chief factors influencing financial differences and quantify their impacts at the whole-farm level under risk. Economic activity of 23 representative dairies in Washington, California, Missouri, New Mexico, New York, Wisconsin, Vermont, Florida, Idaho, and Texas (figure 1) was evaluated over a six year

horizon (2006-2011) and the influences of key production and input cost variables compared among dairies.

Sensitivity elasticities (SEs) were used to compare the impacts of selected change variables on the profitability of representative dairy operations. Use of SEs improves upon previous work of this type that used regression analysis and coefficients of separate determination because actual ranch-level production risk is modeled stochastically for 100 iterations per year. This added to the robustness of the analysis. SEs are similar to elasticities, but they quantify the average percentage change in a selected key output variable to a one percent change in an exogenous variable X (Richardson).

## **Methods and Data**

Monte Carlo simulation was used to estimate the effects of changes in key production and input expense variables on profitability at the whole-ranch level. FLIPSIM, a farm-level simulation model, has been used for more than two decades to evaluate the likely impacts of policy alternatives (Richardson and Nixon). Using actual farm-level data for milk production and culling rates along with known historical variation in milk, cattle, and feed prices, FLIPSIM internally estimates parameters for multivariate empirical (MVE) probability distributions, then uses those parameters to simulate the MVE distributions. The program uses a set of standard assumptions and analyzes each representative agricultural operation using macro level projections of prices, inflation rates, and crop yield growth developed in the December 2006 FAPRI Baseline.

Economic and production data were available for eight representative beef cattle operations that have been developed and maintained by faculty of the Agricultural and Food Policy Center (AFPC) at Texas A&M University utilizing consensus-building interview

processes. The representative dairies range in size from 85 to 3,000 head of dairy cows. All information about the operations was fact-checked with panels of three to six producers before being included in any AFPC analysis. Table 1 presents characteristics of the dairies included in this study.

To facilitate comparison across dairies, key assumptions are imposed across the set. Dairy herd sizes are held constant over the planning horizon. Minimum family living withdrawals are assumed to be the higher of ten percent of gross receipts of \$20,000 per year. Accordingly, as a dairy's profitability increases, family living withdrawals increase, as well. No off farm income, including family employment, is included in the analysis. Each dairy started 2004 with 30 percent debt on land and equipment.

Economic activity for the twenty-three representative dairies was simulated under nine scenarios per dairy using FLIPSIM. Along with the base (no change) scenario, the dairies were simulated with one percent changes in cattle prices, milk prices, milk production, cull and death rates, fuel expenses, labor expenses, dairy input expenses, and interest rates on net cash farm income (NCFI). NCFI was selected as a proxy for annual profitability.

Starting values for the change variables are reported in Table 2 (table 2 is still under development); along with the 2006 deterministic NCFI totals for each of the twenty-three dairies firms. Along with cattle prices (steer, heifer, cull cow, cull bull, and replacement cattle), these 2006 numbers were each increased by one percent and formed the basis of the eight scenarios that were compared with the base (no change) scenario for each ranch. Economic activity for each scenario was simulated over the 2006 through 2011 analysis period. For each iteration of the model, the average NCFI for 2006-2011 was recorded. The 20,700 individual NCFI

calculations (twenty-three ranches times nine scenarios times 100 iterations) were copied from FLIPSIM into Excel to calculate sensitivity elasticities.

## **Results**

The results are being worked on at this time and will be available in a full paper at a later date.

## **Conclusions and Implications**

This research is still on going and at this time the conclusions and implications are still being discussed and researched. They should be determined in the near future and a revised version of the paper will be resubmitted.

## **References**

Richardson, J.W., and C.J. Nixon. *Description of Flipsim V: A General Firm Level Policy Simulation Model*. Texas Agricultural Experiment Station, Bulletin B-1528, 1986.

Sartwelle, III, J.D. J.L. Outlaw, J.W. Richardson. "Financial Impacts of Regional Differences in Beef Operations." Selected Paper, 2006 Southern Agricultural Economics Association Annual Meeting, Orlando, Florida. February 5-8, 2006.

Table 1. Description of Representative Ranches Included in this Study.

Ranch Name	Location	Description
CAD1710	Tulare County, California	A 1,710-cow, large-sized central California dairy. The farm plants 1,100 acres of hay/silage for which it employs custom harvesting. Milk sales generated 92 percent of 2005 total receipts.
NMD2125	Dona Ana and Chaves County, New Mexico	A 2,125 cow, large-sized southern New Mexico dairy. This farm purchases all commodities necessary for blending its own total mixed ration and plants no crops. Milk sales accounted for 91 percent of 2005 total receipts.
WAD250	Whatcom County, Washington	A 250-cow, moderate-sized northern Washington dairy. This farm plants 200 acres of silage and generated 90 percent of its 2005 gross receipts from milk sales.
WAD850	Whatcom County, Washington	An 850-cow, large-sized northern Washington dairy. This farm plants 605 acres for silage annually. During 2005, 93 percent of this farm's gross receipts came from milk.
IDD1000	Twins Falls County, Idaho	A 1,000-cow, moderate-sized central Idaho dairy. This farm plants no crops. Milk sales accounted for 89 percent of IDD1000's gross receipts for 2005.
IDD3000	Twins Falls County, Idaho	A 3,000-cow, large-sized central Idaho dairy. This farm plants 2,000 acres for silage annually. Milk sales represent 91 percent of this farm's gross receipts.
TXND3000	Bailey County, Texas	A 3,000-cow, large-sized dairy located in the South Plains of Texas. This farm plants 180 acres of sorghum for silage annually. Milk sales account for 90 percent of 2005 gross receipts.
TXCD550	Erath County, Texas	A 550-cow, moderate-sized central Texas dairy. TXCD550 plants 500 acres of hay each year. Milk sales represented 91 percent of this farm's 2005 gross receipts.
TXCD1300	Erath County, Texas	A 1,300-cow, large-sized central Texas dairy. TXCD1300 plants 400 acres of silage annually. During 2005, milk sales accounted for 92 percent of receipts.
TXED550	Hopkins County, Texas	A 550-cow, moderate-sized northeast Texas dairy. This farm has 300 acres of improved pasture and 50 acres of hay. During 2005, milk sales represented 92 percent of annual receipts.
TXED1000	Hopkins County, Texas	A 1,000-cow, large-sized northeast Texas dairy. This farm plants 750 acres of hay/silage. This farm generated 90 percent of 2005 receipts from milk sales.
WID145	Winnebago County, Wisconsin	A 145-cow, moderate-sized eastern Wisconsin dairy. The farm plants 237 acres of silage, 60 acres for hay, 184 acres of corn, and 99 acres of soybeans. Milk constituted 90 percent of this farm's 2005 receipts.
WID775	Winnebago County, Wisconsin	A 775-cow, large-sized eastern Wisconsin dairy. The farm plants 696 acres of hay and 454 acres of silage each year. Milk sales comprised 93 percent of the farm's 2005 receipts.

NYWD800	Wyoming County, New York	An 800-cow, moderate-sized western New York dairy. This farm plants 690 acres of silage and 750 acres of haylage annually. Milk sales accounted for 93 percent of the gross receipts for this farm in 2005.
NYWD1200	Wyoming County, New York	A 1,200-cow, large-sized western New York dairy. This farm plants 2,160 acres for silage annually. Milk sales accounted for 92 percent of the gross receipts for this farm in 2005.
NYCD110	Cayuga County, New York	A 110-cow, moderate-sized central New York dairy. The farm plants 80 acres for hay, 64 acres for corn, and 131 acres for silage annually. Milk accounted for 90 percent of the gross receipts for 2005 on this dairy.
NYCD500	Cayuga County, New York	A 500-cow, large-sized central New York dairy. This farm plants 714 acres of hay and haylage and 386 acres of silage. Milk sales make up 93 percent of the 2005 total receipts for this dairy.
VTD140	Washington County, Vermont	A 140-cow, moderate-sized Vermont dairy. VTD140 plants 30 acres of hay, and 190 acres of silage annually. Milk accounted for 89 percent of the 2005 receipts for this farm.
VTD400	Washington County, Vermont	A 400-cow, large-sized Vermont dairy. This farm plants 100 acres of hay and 900 acres of silage annually. Milk sales represent 90 percent of VTD400's gross receipts in 2005.
MOD85	Christian County, Missouri	An 85-cow, moderate-sized southwest Missouri dairy. The farm plants 190 acres of hay and 32 acres of silage. Milk accounted for 86 percent of gross farm receipts for 2005.
MOD400	Dade County, Missouri	A 400-cow, large-sized southwest Missouri dairy. The farm plants 315 acres of hay, 135 acres of silage, and 150 acres of improved pasture annually. Milk accounted for 93 percent of gross farm receipts for 2005.
FLND500	Lafayette County, Florida	A 550-cow, moderate-sized north Florida dairy. The dairy grows 130 acres of hay each year. All other feed requirements are purchased in a pre-mixed ration. Milk sales accounted for 93 percent of the farm receipts.
FLSD1500	Okeechobee County, Florida	A 1,500-cow, large-sized south central Florida dairy. FLSD1500 plants 100 acres of hay and 400 acres of silage annually. Milk sales represent 94 percent of 2005 total receipts.